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(Research Article)

Eclipta alba: A Phytopharmacognostic Study

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ABSTRACT

Pharmacognostic studies of crude drug plays a very important role in identification of the purity and quality of crude drugs. Medicinal plants which are found on earth have renowned medicinal significance and their usage is increasing day by day in our daily life. Different researches are going on to explore the pharmacological and medicinal properties of herbal drugs. The herb of Eclipta alba is commonly called as Bhringaraja or Maka, belonging to the family Asteraceae/Compositae. The present work embodies the investigations carried out to establish methods for quality control of herb as per WHO guidelines. Complete botanical evaluation which comprises macroscopic, microscopic, phytochemical evaluation and physicochemical parameters like loss on drying extractive value, ash value. The study will provide referential information for the correct identification of the crude drug.

Key Words: *Eclipta alba* , Pharmacopoeial standards, Quality Standards, Standardization.

INTRODUCTION

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years. In recent times, focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems. Today, we are witnessing a great deal of public interest in the use of herbal remedies[1]. Indian Materia Medica includes about 2000drugs of natural origin of which approximately 400 are mineral and animal origin while the rest are of vegetable origin. The World Health Organization has also recommended the evaluation of the effectiveness of plants in conditions where there is lack of safe synthetic drugs[2]. Standardization of these crude drugs is an important task before researchers. *Eclipta alba* is commonaly known as Bhringaraja or Maka belonging to the family Asteraceae / Compositae. The herb contain wedelolactone and demethylwedelolactone which possessing potent antihepatotoxic property[3]. Other Prominent chemical constituents present are Ecliptal, Ecliptine, Ecliptalbine, α-Terthienylmethanol, β-amyrin, Sigmasterol, Polypeptides etc. The other pharmacological activities shown by plants are Antiviral, Antibactarial, Spasmogenic, Hypotensive, Analgesic, Antioxidant etc.[4] The present article describes pharmacognostical, physicochemical and phytochemical evaluation of *Eclipta alba*. The main objective of this study is to supplement some information regarding correct identification and standardization of *Eclipta alba* herb.

MATERIALS AND METHODS

Collection of Sample

Eclipta alba herb was collected from local area in Pune. Their identity and authentication was confirmed by Botanical Survey of India, Pune with Voucher No. Bhilwade_1. The remaining sample was dried in shade. Coarse powder (60#) of dried plant was stored for their microscopical evaluation, proximate chemical analysis and phytochemical investigations.

Macromorphology

The entire herb *Eclipta alba* and its powder was evaluated for its sensory profile by observing of its colour, odour and taste along with some extra macroscopical characters as per standard WHO guidelines. [5-7]

Cytomorphology

The transverse sections of the aerial parts viz leave and stem were taken, cleared with clearing agent and mounted in glycerine water. Microscopy of herb powder was studied for evaluating various parts present in the powder. The detail cytomorphological characters were observed under Digital microscope (MOTIC-B1) and organ detection and quantitative microscopy i.e. evaluation of leaf constant was reported according to the prescribed method.[8,9]

Microchemical Testing

For detection of cell wall composition and cell contents, the transverse sections of leaves, stem and powders were treated with different but specific staining reagents and observed

under Digital microscope (MOTIC-B1). The cell wall composition, cell contents and tissue detection was reported separately. [8,9]

Physicochemical Evaluation

Evaluation of crude drug helps in the identification of a drug and establishes standards for the quality and purity of drugs. The main reason behind the need for evaluation of crude drugs is biochemical variation in the drug, effect of treatment and storage of drugs and adulteration and substitutions.[10] Phytopharmacopoeial specification for the plant materials should be developed to enable the quality control chemists to verify and approve the materials.[11] The various physicochemical parameters viz. ash values, extractive values and loss on drying. Determinations of these physicochemical constants were done as per the procedures mentioned in accordance with the WHO guidelines.[12,13]

Preliminary Phytochemical Screening

The chemical evaluation includes qualitative chemical tests which are used for identification of various phytoconstituents present in the powered crude drug.[14,15]

RESULT AND DISCUSSION

Macromorphological Description

The morphological studies revealed the information about size and shape of the aerial parts of the *Eclipta alba.* Leaves are sessile, lanceolate, entire and were 3-5 cm in length and 2-3 cm wide.. Stem is cylindrical with longitudinal ridges, brownish in color and shows thickness of 0.2-0.3 cm. The organoleptic evaluation of the herb powder revealed that herb powder was brown in color, with characteristic odor and bitter taste. The macromorphological evaluations of the aerial parts are mentioned in Table 1.

Cytomorphological Description

Figure 2 reveals the transverse section of the leaf passing through midrib region, which showed the presence of upper and lower epidermis, mesophyll and mid rib region. Both epidermal layers were made up of single layered with rectangular straight wall cells. The upper as well as lower epidermis shows presence of unicellular covering trichomes, anisocytic stomata and few glandular trichomes. The mesophyll region was composed of single layer of palisade cells, and spongy parenchyma. While the midrib portion was consists of collenchymas and vascular bundle. Palisade cells were single layered, compact and radialy elongated and were present beneath the upper epidermis and were not in continuous manner which revealed the nature of leaves as a dorsiventral type. The spongy parenchyma region was made up of parenchymateous cells which were round or oval in shape and were loosely arrange which shows the presence of intercellular spaces. The midrib region reveals the presence of 2-3 layers of compactly arranged cells of collenchyma just between the two layers of epidermis. A well developed vascular bundle was found to be embedded within the midrib region. Fig. 3 reveals the surface preparation of leaf. It shows the presence of Anisocytic stomata surrounded by three subsidiary epidermal cells, of which one is markedly smaller than others. It also shows presence of unicellular covering trichomes. Table no 2 revealed the values observed for leaf constants. Fig. 4A and 4B reveals the transverse section of stem. It shows following parts as Epidermis, cortex, vascular bundle covered with pericyclic fibers and pith. The epidermis is single layered, quadrangular cells. The cortex shows presence of many layers of thin walled cellulosic parenchyma and vacuoles. Below cortex lignified pericyclic fibers are present; they cover the vascular bundle so also called as strengthening cells. Below this a well developed vascular bundle is present. Innermost layer of pith consists of large, thin walled, big rounded cells. Fig. 5 reveals the powder microscopy of plant powder. It shows the presence of epidermal cells, unicellular trichomes and phloem fibres.

Microchemical Testing

The results of microchemical testings were mentioned in Table-3 which reveled the nature of cell wall and cellular contents.

Physicochemical Parameters

The results of the physicochemical constants of raw material lie within the limit which is depicted in Table-4; this signifies that the quality and purity of raw material was good enough; Moisture is an inevitable component of crude drugs, which must be eliminated as far as practicable. Deterioration time of the crude drugs depends upon the amount of water present in formulation. If the water content is high, the crude drugs can be easily deteriorated due to fungus and the moisture content of the crude drugs was found to be 0.467±0.153% which signifies that the material was properly dried and properly stored. The results of Ash values signify the purity of drug that is the presence or absence of foreign matter such as metallic salt or silica present in the raw material. The total ash usually consists of carbonates, phosphates; silicates and silica which include both physiological ash and non-physiological ash, the values are 13.9±0.283% for total ash. Acid insoluble ash particularly indicates contamination with silicious materials e.g., earth and sand, comparisons of this with the total ash value of the same sample will differentiate between contaminating materials and variations of the natural ash of the drug which was found to be 2.55±0.354 %. The water soluble ash was found to be 07.90±0.0.424 %, this parameter is used to detect the presence of material exhausted by water whereas the value for Sulphated ash was found to be 03.80±0.424 % which is within fairly wide limit. As the ash values of the crude drugs lies with in the fair limit which signify its quality and purity and gives idea about the total inorganic content. The total soluble active constituents of crude drugs in any particular solvent or mixture of solvent determined by extractive value. The water soluble extractive value found to be 16.35±0.636 % while the alcohol soluble extractive value was found to be 06.05±0.212% which signifies the nature of the phytoconstituents present in plant.

Preliminary Phytochemical Screening

The preliminary phytochemical investigations of powdered root were performed which shows the presence of Carbohydrates, Proteins, Steroids, Flavonoids, Alkaloids and Tannins type of major primary and secondary metabolites which revealed their potent therapeutic activity. The results of the screening were express in Table-5.

CONCLUSION

Standardization is essential measure for quality, purity and sample identification. Macromorphology and Cytomorphology along with the Quantitative analytical microscopy is one of the simplest and cheapest methods to start with for establishing the correct identity of the source materials. Physiochemical and qualitative Chemical analysis of leaves and stem confirm the quality and purity of plant and its identification. Here the information collected was useful for further pharmacological and therapeutical evaluation along with the standardization of plant material.

Table 1: Macroscopic characters of plant parts

Sr No.	Characters	Observation		
		Leaves	Stem	Root
Organoleptic Characters				
1.	Colour	Green	Greenish brown	Light Brown
2.	Odour	Characteristic	-	-
3.	Taste	Bitter	-	-
Quantitative Macromorphology				
4.	Length	2-4 cm		
5.	Diameter / width	1-2 cm		
Macroscopical Features				
6.	Shape	Oblong, Lanceolate	Cylindrical	Cylindrical
7.	Type	Sessile	-	-
8.	Texture	-	Longitudinal ridges	-
9.	Surface	Smooth	rough	Hairy

Table 2: Leaf constants

1.	Stomatal No.	6-8
2.	Stomatal index	22.58
3.	Palisade ratio	1:7

Table No. 3: Microchemical test

S.N.	Reagent	Observation		Characteristic	
		Leaves	Stem	Leaves	Stem
1.	Phlorogluinol + Conc. HCL (1:1)	Pink	Pink	Lignified tissues viz vascular bundle	Lignified fibres, vascular bundle, pericyclic fibres
2.	Rhudenium red	-	-	-	-
3.	Iodine solution	-	-	-	-

Table 4: Physicochemical evaluation

Sr. No.	Parameters	Standard
Physical Constants		
1	Moisture content (LOD) (% w/w)	0.467±0.153
Ash Values		
2	Total ash (% w/w)	13.90± 0.283
3	Acid insoluble ash (% w/w)	02.55± 0.354
4	Water soluble ash (% w/w)	07.90±0.424
5	Sulphated ash (% w/w)	03.80±0.424
Extractive Values		
6	Alcohol soluble extractive value (% w/w)	06.05±0.212
7	Water soluble extractive value (% w/w)	16.35±0.636

Table 5: Preliminary phytochemical screening

Sr. No.	Parameters	Observation
1	Carbohydrates	+
2	Amino acids	+
3	Glycosides	-
4	Flavonoids	+
5	Volatile oil	-
6	Alkaloids	+
7	Tannins	+
8	Steroids	+

Fig.1: Morphology of *Eclipta alba*

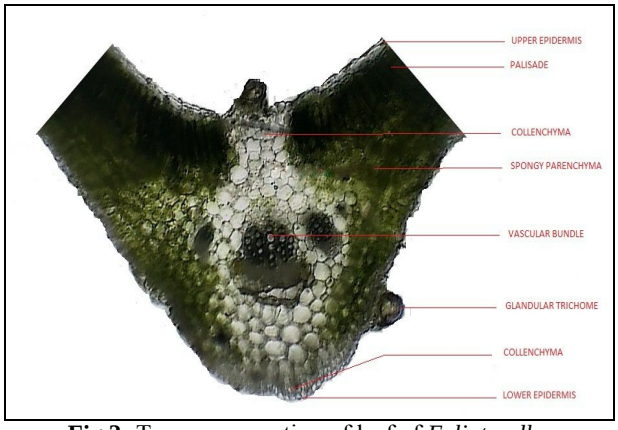

Fig.2: Transverse section of leaf of *Eclipta alba*

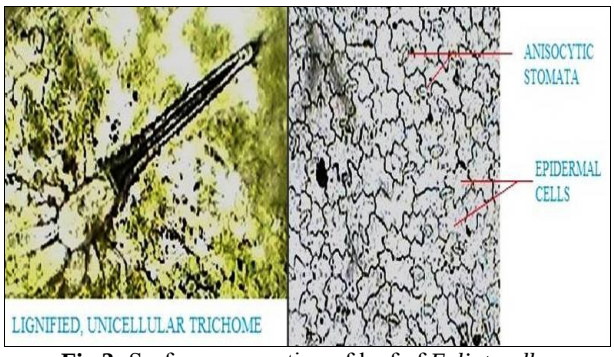

Fig.3: Surface preparation of leaf of *Eclipta alba*

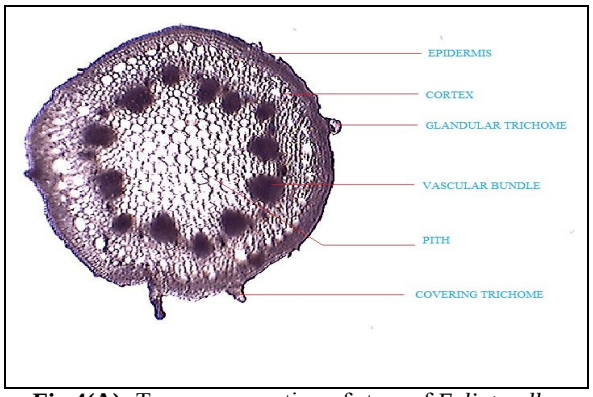

Fig.4(A): Transverse section of stem of *Eclipta alba*

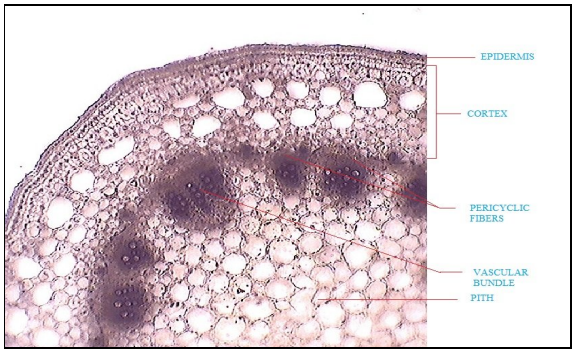

Fig.4(B): Transverse section of stem of *Eclipta alba*

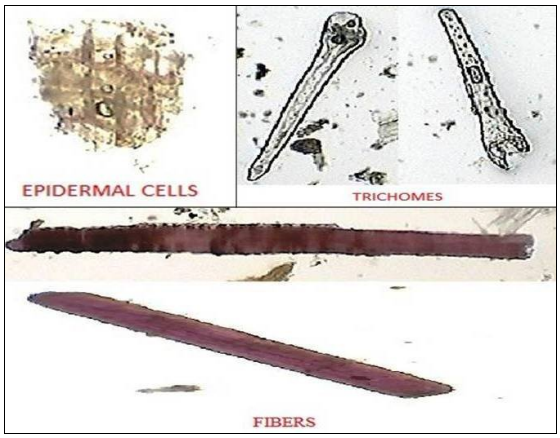

Fig.5: Powder Characteristics

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